

The Olympus High Performance Computing Cluster: A Resource for MIDAS Researchers

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What is Olympus?

Olympus is a supercomputing cluster provided **free of charge** to MIDAS Researchers.

What can I do with Olympus?

Run simulations, host services, store data sets, “Big Data” analytics...

How do I get access to Olympus?

Sign up for an account at: <http://www.epimodels.org>

Can I get support?

HPC Services and PSC Staff stand ready to help you get started.

Olympus

- **69 Compute Nodes, 2,684 CPUs, 16 TB of RAM**
 - 8 64-core AMD 2.3 Ghz Processors with 512 GB of RAM
 - 16 64-core AMD 2.3 Ghz Processors with 256 GB of RAM
 - 20 28-core Intel Xeon Ex Series 2.3 Ghz Processors with 128 GB of RAM
 - 20 28-core Intel Xeon Ex Series 2.3 Ghz Processors with 256 GB of RAM
 - One "Big Data" 56-core Intel Xeon 2.3 Ghz Processors with **1TB of RAM**
- **7 Application Servers**
 - Hosting ISG Webservices, Databases, and MIDAS Applications
- **Large High Performance File Storage**
 - 140 TB of High Speed Shared File System
 - Local Disk and SSD Based File Storage
- **Connected by Intel OmniPath Interconnect**

Olympus (Translated To English)

- Large capacity of CPUs brings time to solution down
 - Large scenario spaces all at once
 - Large parameter sweeps all at once
- Large shared memory nodes
 - Highly flexible support for virtually any type of modeling
 - Highly flexible support for all types of programming models (R, Python, C++, Java)
 - Larger more detailed simulations
- "Big Data" Capabilities
 - Larger more complex data analytics with large memory nodes connected to high speed parallel file system
 - Host large datasets and make accessible to external tools and people

Olympus (Translated To English)

- Develop your applications
 - Application nodes connected to high performance computing to host your applications
 - Locating at PSC provides extreme bandwidth to outside world (free of charge to MIDAS)
- Fastest high speed interconnect available on the market
- Located at the PSC
 - Backed by 30 years of experience in supporting researchers in getting science done

Delivered over 5 million CPU hours of computing to MIDAS Investigators

Providing Olympus: Sample Success Stories

Dr. Travis Porco
UCSF

“For agent-based microsimulation, it is essentially impossible to do without truly substantial resources such as the cluster offered. For particle filtering, the cluster enabled fast development times and surge capacity to meet deadlines.”

- Conducted dynamic particle filtering models for fitting the Ebola epidemic
- Implemented agent-based models of contact investigation in measles and transmission of HIV through a dynamic contact network of intravenous drug users.
- Two publications resulted from this work (PMID 26484544, 25928152)

Dr. Wilbert Van Panhuis and Guido Carmargo España
University of Pittsburgh

“The large amounts of memory available on the Olympus Cluster allowed us to run our very large simulations as well as run a large number of them to produce a meaningful study.”

- Simulated the geographic spread of Chikungunya during the 2014-15 epidemic in Columbia with the FRED agent-based model.
- Each simulation involved 50 million agents and required large amounts of RAM memory to run an individual instance

Dao Nguyen and Dr. Edward Ionides
University of Michigan

“By providing an easy-to-use applications programming interface (API), all I have to do is to model and fit data and the tasks used to take days or week can now run in hours, making the tasks feasible and enjoyable.”

- Utilized Olympus to fit malaria models with control using simulation-based interfaces written in R.
- Work is currently under review in the Journal of Statistics and Computing.

Drs. Sam Ventura and William Eddy
Carnegie Mellon University

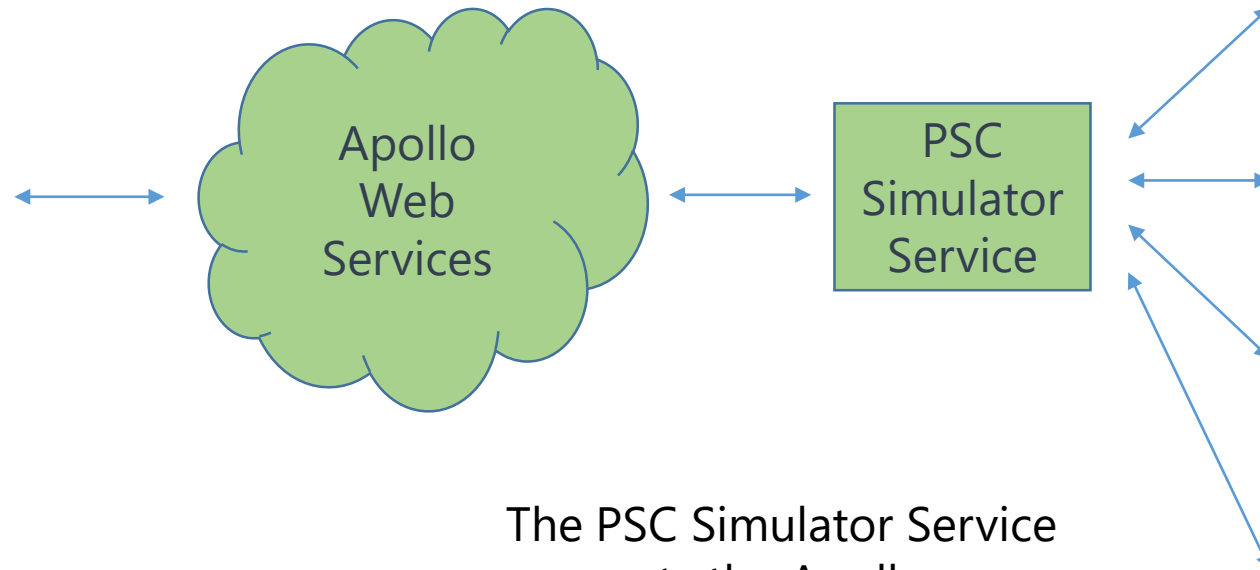
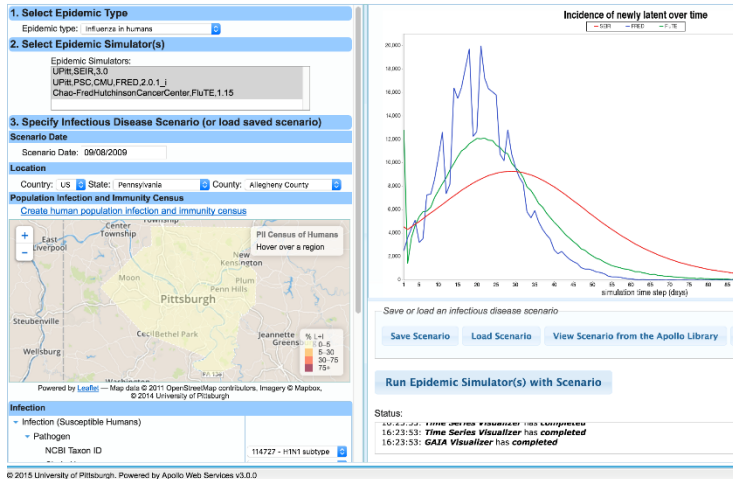
“Because we have access to Olympus, we are able to obtain major speed-ups on tasks that would take several days to complete, allowing us to be responsive to the MIDAS Research Network in a manner that would otherwise not be possible.”

- Generating synthetic ecosystems for different countries and geographic regions in urgent response to disease outbreaks.
- Utilized Olympus high-performance large shared filesystem to provide immediately and automatically synthetic ecosystems to the public.



Olympus User: Apollo Web Services

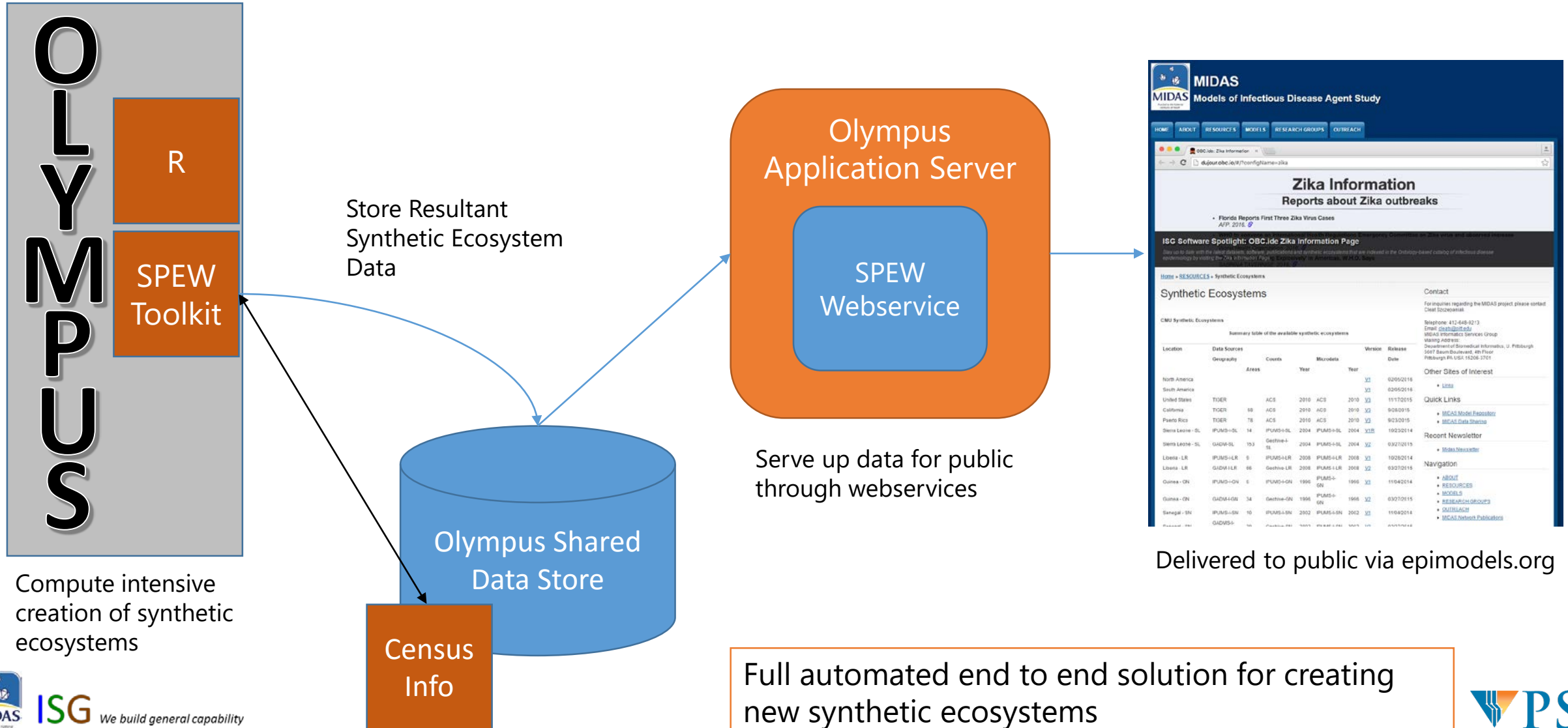
Simple End-user Apollo App



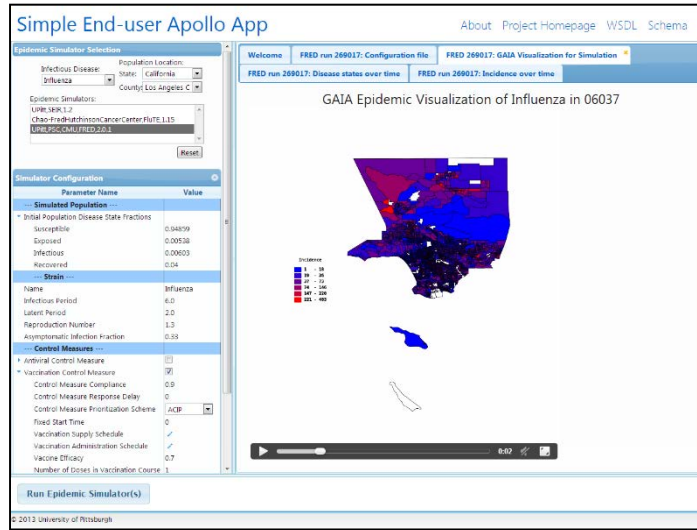
A software developer can send a single infectious disease scenario to the Apollo Network and run it on multiple simulators.

The PSC Simulator Service connects the Apollo Network to the simulators hosted on Olympus.

Olympus User: SPEW Synthetic Ecosystems



HPC Services: Creating Accessible Web Services



End-user applications

Calls service and receives data

Apollo Data Services

Apollo Data Store
Stores Inputs and Outputs

Apollo Web Services
Translates Standard Inputs
into Disease Transmission
Model Specific Inputs

HPC Web Services
Brokers Disease
Transmission Model Runs

Cloud Computing

Olympus

XSEDE

XSEDE 1

Bridges

XSEDE 3

XSEDE 4

Acknowledgements

- Olympus is funded through MIDAS U24 “Informatics Services Group”



Olympus available to you



- **Freely available** to all MIDAS Researchers
- Sign up for an account at: <http://www.epimodels.org>
- Also watch the YouTube video at: https://youtu.be/8DoMUjl_yCw
- Please join us for the discussion afterwards:
 - We want to hear what you need and how we can make Olympus useful to you.